

Project Milestone Report

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Major Changes

There is no major change in goals of the project.

What I Have Accomplished So Far

- I changed the syntax of signaling intent of quantification lifting. The previous syntax requires that one additional parameter be added to the module parameter list. The new syntax adds a `lifted` keyword to the language, making the syntax much cleaner.
- I proposed a rule for the quantification lifting:

$$\frac{e : \tau_1 \rightarrow \tau_2 \quad L = effects(\tau_1) \cup hoeffects(\tau_1) \quad U = \{\epsilon \mid hoSAFE(\tau_1, \epsilon)\}}{lifted\ e : \forall \epsilon (L \subset \epsilon \subset U). \tau_1 \rightarrow \tau_2(\epsilon)}$$

The rule is not yet implemented since the language doesn't have support for expressing the effect bound in the conclusion of the rule.

Meeting My Milestone

I did not meet the milestone described in my project proposal, which is to implement the import bound inferencing rules from Craig et al. I have implemented a basic version of the checking rule. However, since the implementation of the rules requires adding new construct to the language, the complete implementation is more complicated than expected.

Surprises

We found that to implement the bound inference rule, I need to express bounds of effect in intermediate language in Wyvern compiler, which is currently not implemented. Therefore I need to add the implementation into my revised 15-400 milestones.

Revisions to My 15-400 Milestones

Because of the problem stated above, I need to set the implementation of effect bounds in WyvernIL and the complete implementation of import bound inference as the first milestone of 15-400. The new set of milestones would be:

1. February 1st: Implementation of import bound inference.
2. February 15th: Do case studies and measure the number of effect annotations (with/without quantification lifting).
3. March 1st: Prepare for Human subject experiments: make plans for the experiment and submit a proposal to IRB

4. March 22nd: Prepare for Human subject experiments: design programming tasks that are used in experiment.
5. April 5th: Finish Human subject experiments: comparing productivity of programmers on some tasks
6. April 19th: Do more case studies based on bounded effect polymorphism
7. May 3rd: Enforce separation of effect-annotated and effect-unannotated code

Resource Needed

I will use funds from my advisor to pay human subjects in human subjects experiments. I have all of the resources that I need to conduct this study.